

THE ENTOZOA OF MONOTREMATA AND
AUSTRALIAN MARSUPIALIA. No. i.

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Some little time ago, there was placed at my disposal a collection of Australian Entozoa, a goodly number of which were from marsupials. The greater part of the collection was got together by Prof. J. P. Hill, D.Sc., while in Australia, and Mr. S. J. Johnston, B.A., B.Sc., of the Biology Department, Sydney University.

I have thought it advisable that the first paper under the above heading should be of an introductory character. Since no one as yet has brought together a systematically arranged list of the known or imperfectly known parasites of these two interesting Orders of mammalia, it is my intention to state under each host the names of its known Entozoa, with a list of references to each. Dr. G. Sweet⁽³⁶⁾ has recently published a Census of Australian Entozoa, in which many of the following references have been noted. Dr. von Linstow⁽²⁹⁾ mentioned some of the earlier records in his "Compendium der Helminthologie," 1878, and its Supplement, 1888.

The most important workers in this subject are Prof. Zschokke and Dr. Janicki (Cestoda), and Dr. von Linstow (Nematoda). A fair number of imperfectly described forms have been recorded, amongst them being Krefft's species,⁽²⁴⁾ all of which require redescription in order to place them systematically.

Although the work will be almost entirely restricted to Cestoda, yet for reasons mentioned I have preferred to use the wider term

“Entozoa.” The numbers in thick type refer to literature indicated in the bibliography, in which the forms are mentioned.

MONOTREMATA.

1. ORNITHORYNCHUS ANATINUS Shaw (syn. *O. paradoxus* Blumenb.).

Distomum ornithorhynchi S. J. Jnstn.(21) (N.S.W.). This is the only endoparasite described from the Platypus. Dr. Cobb mentioned that he found one, but did not indicate to what class it belonged.

2. TACHYGLOSSUS ACULEATUS Shaw (*Echidna hystrix* Home).

Linstowia echidnae Thompson(37) (N.S.W., Queensland).

Tenia phoptica Cobbold(12) (Queensland?).

Linstowia echidnae was originally described as *Tenia echidnae* by Thompson,(37) from material taken from New South Wales to London by Prof. Anderson Stuart. Prof. Zschokke(45), however, gave a much fuller account, based on specimens collected by Dr. Semon in Queensland, making it the type of a new genus, *Linstowia*.

Cobbold(12) in his book “Parasites: a Treatise on the Entozoa, etc.,” mentioned that he had examined some cestodes collected by Dr. Bancroft of Queensland, from the common Australian Echidna, *Tachyglossus setosus* (which is only a variety of *T. aculeatus*). The strobilæ of these averaged three inches in length, the segments being very narrow, and closely set. By the term narrow, he apparently referred to their length, as he stated that the greatest width was three-eighths of an inch. He gave the name *Tenia phoptica*. The above-mentioned characters agree fairly closely with those of *L. echidnae*, and there is little doubt but that the two names refer to the same species, which is a common and rather abundant parasite of the Echidna. Cobbold’s description is so meagre that I think that the worm should still be known as *Linstowia echidnae* instead of *Linstowia phoptica*. Cobbold’s name is little more than a *nomen nudum*.

References to *L. echidnae*, 12,20,34,37,40,41,42,43,44,45.

MARSUPIALIA.

3. MACROPUS GIGANTEUS Zimm.(syn. *M. major* Shaw).

Moniezia festiva (Rud.)(8,12,14,15,24,33,40,43,44,45).

Echinococcus polymorphus Dies.(22,31).

Distomum (Fasciola) hepaticum Abildg.(4,12,14,22,24,33).

Filaria websteri Cobbold(12,14,17).

Filaria sp., Bancroft(1).

Moniezia festiva infests the gall-bladder and bile-duct. It was originally described very briefly by Rudolphi(33) as *Tenia festiva*, and figured by Bremser.(8) The locality mentioned was "Australia." Dujardin(25) and Diesing(14) merely repeated Rudolphi's short account. No other helminthologist, except Cobbold(12), appears to have studied this worm, though Blanchard(5) recognised that, from Rudolphi's description, the species would probably come under his new genus *Moniezia*. Kreffft(24), Stiles(25), Zschokke(45,46,47) and Janicki(20) referred to this parasite, but did not add any new facts. I have recently examined superficially some specimens collected in New South Wales from this host, which apparently belong to *M. festiva*.

Pagenstecher(31) recorded the occurrence of hydatids (*Echinococcus polymorphus* Dies.) in a Great Kangaroo which had died in Cologne.

The common liver-fluke *Distomum (Fasciola) hepaticum* Abildg., is not infrequently met with in the bile-ducts of various kangaroos, including this species. Rudolphi(33), Diesing(14), Bremser(quoted by Diesing), Cobbold(12), Bennett(4), Braun(7)(from Australia), Kreffft(24)(from New South Wales or Queensland), and myself(22) (from New South Wales) have recorded its presence.

Filaria websteri Cobbold(syn. *F. macropodis gigantei* Webster), has been mentioned by Webster, Cobbold(12), and Fletcher(17) as infesting the knee-joint of this host. *Filaria* sp., recorded by Bancroft(1) is probably the same species.

It is quite possible that the hydatid and the liver-fluke have established themselves as parasites of the Marsupialia, since the settlement of the white man, with his domesticated animals in

this continent. Fielder has shown that the eggs of the fluke may pass through the typical larval stages within some of our fresh-water gastropods, especially species of *Bulinus* (*Limnaea*). The cercariæ produced might, after encystment on grass, etc., be transferred passively with the food into herbivorous marsupials, and reach maturity, in the same way as in sheep and cattle, in both of which fluke is not uncommon in Eastern Australia, especially in New South Wales and Victoria.

Tania echinococcus v. Lieb., the adult of the hydatid, occurs in dogs in New South Wales, Tasmania, South Australia, West Australia, and most probably in the other States, and has been recorded by von Lendenfeld, Cleland (West Australia), Braun (Australia), and Stirling (S. Australia) from *Canis dingo*. We do not know whether the dingo harboured this parasite before the arrival of the dog, and it is therefore not yet possible to state definitely whether the hydatid has established itself comparatively recently in the Marsupialia. The examination of hosts from parts of the continent where the dog is unknown, would assist in deciding both questions. It may not be out of place to mention that the hydatid is, in all probability, the commonest endoparasite in Australia, being frequently met with in New South Wales in human beings, sheep, cattle and pigs, and rarely in horses. The same remark applies equally to other parts of the Commonwealth.

4. MACROPUS DORSALIS Gray.

Echinococcus polymorphus Dies.(2,11,22) seems to be the only recorded parasite. Dr. Bancroft(2) of Queensland, recorded its presence in the lungs, Cobb(11) merely mentioning this reference.

5. MACROPUS DERBYANUS Gray.

Moniezia festiva Rud., has been identified by Cobb(12) from this host (Dr. Bancroft's collection, Queensland?).

6. MACROPUS ANTILOPINUS Gould.

Filaria roemeri v. Linstow(29)(Australia).

7. MACROPUS BROWNI Ramsay.

Cloacina dahli v. Linstow(28); a nematode from the alimentary canal (Bismarck Archipelago).

8. MACROPUS UALABATUS Less. & Garn.

Zoniolaimus setifera Cobb(9); a nematode inhabiting the stomach of the brush wallaby (New South Wales). Cobb(9) also mentioned *Z. brevicaudatus* Cobb, but did not state the name of the host. Perhaps it was also obtained from a macropod.

9. MACROPUS RUFICOLLIS var. BENNETTII Waterh.

Filaria sp.—Eisig(18) mentioned the occurrence of a *Filaria* in the pericardium of *Macropus bennettii* Waterh., but no locality was stated. This host is now regarded as a variety of *M. ruficollis* Desm.; and, since it only occurs in Tasmania, we may safely set down that island as the locality of the specimen.

10. MACROPUS sp.

I am including under this heading the names of entozoa recorded from hosts designated "kangaroo," "wallaby," *Macropus* sp., and *Halmaturus* sp.

Cittotenia zschokkei Janicki(20,19)(*Macropus*; New Guinea).

Bothriocephalus (?) *marginatus* Kreff(24)(wallaby; Queensland).

Tenia fimbriata Kreff(24)(northern wallaby?).

Tenia mastersii Kreff(24)(*Halmaturus*; Queensland).

Distomum hepaticum Linn.(wallaby, kangaroo; loc.?).

Filaria spekei Leidy(25)(wallaby; Australia).

Filaria websteri Cobbold(12)(kangaroo; Queensland?).

Filaria sp. Crisp(13)(kangaroo; loc.?).

The hosts of two of Kreff's species(24), viz., *Bothriocephalus*(?) *marginatus* and *Tenia fimbriata* are not known for certainty, though both probably came from Queensland wallabies. The specific name *fimbriata* was already preoccupied in the genus *Tenia* by Diesing (*T. fimbriata* Dies., = *Thysanosoma fimbriata* Dies.), and consequently cannot stand for Kreff's species. Since

the latter possesses bilateral genital pores, whilst Diesing's has unilateral, they are at least specifically distinct; and accordingly I would suggest the name *Tænia*(?) *kreffti* for this headless specimen.

Tænia mastersii Kreffft(24), is not a true *Tænia*. It probably belongs to the *Anoplocephalince*.

Cobb(10) mentioned having found the liver-fluke in wallabies and kangaroos (New South Wales?). Braun(7) also recorded its occurrence.

Filaria spelæa Leidy(25), was taken from the abdominal cavity of an Australian wallaby, and may be identical with one which I have seen from a similar situation in *Macropus ualabatus* (N. S. Wales).

Bancroft(3) recorded the occurrence of *Filaria websteri* in a kangaroo; whilst Crisp(13) mentioned *Filaria* sp., from the knee-joint of the same animal, apparently referring to *F. websteri*.

11. PETROGALE PENICILLATA Gray.

Triplotenia mirabilis Boas (6) [6,18,20,44].

Filaria australis v. Linstow(27), (Australia).

The former is perhaps the most remarkable adult cestode known, since it consists of an extremely short median strobila, while from each side of the hind part of the scolex there arises a long lateral strobila. Hence the appropriateness of the generic and specific names. Janicki(18,20) and Zschokke(44) refer to this parasite of the above-named rock-wallaby, the former regarding it as a monstrosity arising by the division of an original strobila, Galli-Valerio (in Centr. Bact. f. Parasit. Orig. i. xxxix. 1905, p. 239), supporting this view. *Filaria australis* was found in the body-cavity.

12. PHASCOLOMYS sp.

Tænia bipapillosa Leidy(25).—This parasite was taken from a wombat in the Philadelphia(?) Zoological Gardens. The description is very imperfect, giving only a few external characters, which agree very closely with Rudolphi's short account, and Bremser's figures of *Moniezia festiva*. The scolices, strobilæ,

and arrangement of the genital pores are similar. *Tænia bipapillosa* possesses external features sufficient to justify its inclusion along with *Tænia festiva* in the genus *Moniezia*. There are in my possession a number of tapeworms agreeing externally with *Moniezia bipapillosa*, taken from a wombat (*Phascolomys mitchelli* Owen) in this State; and I hope that, before long, I shall be able to make known the structure of these two species of *Moniezia*.

13. PHALANGER URSINUS Temm

Bertia edulis Zschokke(42)[42, 43, 44].

Bertia sarasinorum Zschokke(42)[42, 43, 44].

These cestodes were collected in the Celebes.

14. PHALANGISTA sp. (= *Trichosurus* sp., or *Phalanger* sp.).

Bertia rigida Janicki(20)[19, 20] from an opossum in New Guinea.

14. TRICHOSURUS VULPECULA Kerr (syn. *Phalangista vulpina* Meyer.).

Tænia phalangistæ Kreffft(24).

Filaria dentifera v. Linstow(30).

The former was very imperfectly described from a Queensland or New South Wales host. The latter was collected in Queensland by Prof. Semon.

15. PHASCOLARCTUS CINEREUS Goldf.

Bertia obesa Zschokke(45)[42, 43, 44, 45].—Described from material collected in Queensland by Semon. This parasite occurs fairly commonly in the "Native Bear" in New South Wales. Cobbold(12) merely mentioned the occurrence in this host of a tapeworm which he called *Tænia geophiloides*, on account of its general resemblance to a long millipede. The name is valueless as no description was given, and in all probability Cobbold's specimen belonged to the above species, so well described by Prof. Zschokke. By a considerable stretch of imagination, *Bertia obesa* might be likened to a much bleached millipede of the genus *Julus*, on account of its plump rounded form.

16. PERAMELES OBESULA Shaw.

Linstowia semoni Zschokke(45)[20,41,42,43,44,45].

Hoplocephalus cinctus v. Linstow(30).

Gigantorhynchus semoni v. Linstow(30).

All the above-named parasites were collected from "bandicoots" in Queensland, by Semon. The last-mentioned parasite is, as far as I know, the only Echinorhynch described from an Australian marsupial.

I have specimens of *L. semoni* and *G. semoni* obtained from this host near Sydney.

17. PERAMELES NASUTA Geoff.

Ascaris sp.—The name is merely mentioned by Krefft(24). There is, in my possession, a cestode resembling *Linstowia semoni*, obtained from this host in New South Wales.

18. THYLACINUS CYNOCEPHALUS Harris.

Dithyridium (Piestocystis) cynocephali Ransom(32). This larval cestode was found in the heart-muscles of a specimen which had died in the Zoological Gardens, Washington, U.S.A.

19. DASYURUS VIVERRINUS Shaw.

Hemogregarina dasyuri Welsh, Dalyell, and Burfitt(39,23). This sporozoon was found in the erythrocytes of a "Native Cat" from New South Wales.

I have a larval Bothriocephalid Cestode, *Sparganum* sp., taken from the body-cavity of this host, from Sydney district.

20. PETAURUS SCIUREUS Shaw.

Hemogregarina petauri Welsh and Barling(38,23). A parasite of the erythrocytes of a "Flying Squirrel," from this State.

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